



NPS photos

An introduction to benthic macroinvertebrate community at Hopewell Furnace National Historic Site

The Mid-Atlantic Inventory and Monitoring Network monitors ecosystem health in ten national parks in the Northeast Region. To measure the health of streams and rivers, scientists sample and identify invertebrates living on the bottom of streams. These invertebrates are called “benthic macroinvertebrates.”

Many states and federal agencies use benthic macroinvertebrates to assess stream health and make determinations about whether streams are meeting standards outlined in the federal Clean Water Act. Ultimately, the goal of the benthic macroinvertebrate monitoring program is to

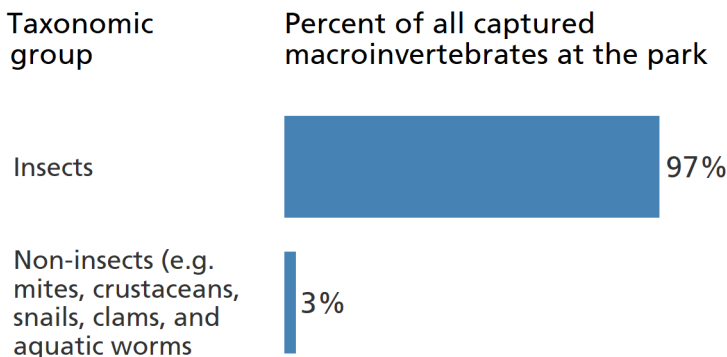
provide the best available science so national park managers can better understand and protect park resources.

This brief provides an introduction to benthic macroinvertebrate communities at Hopewell Furnace National Historic Site. This information includes a general description of benthic macroinvertebrates and, using data from 2009–2018, a summary of macroinvertebrate community characteristics in the park.

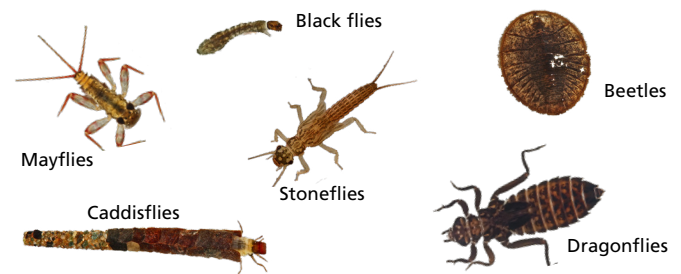
The brief does not address the question of stream ecosystem health — future publications will fill that important role.

What are benthic macroinvertebrates?

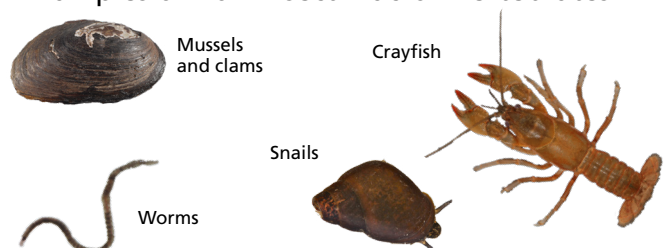
Benthic macroinvertebrates are invertebrates that live on the bottom of streams and rivers and are visible to the naked eye. They include a large number of taxonomic groups. Macroinvertebrates are useful for ecological assessments because their communities can change dramatically at varying levels of pollution. At Hopewell Furnace, most benthic macroinvertebrates are insects. These include the larvae of many common groups like mayflies, caddisflies, stoneflies, and the true flies. Other macroinvertebrates that aren’t insects are also present.



Examples of insect macroinvertebrate larvae



Examples of non-insect macroinvertebrates

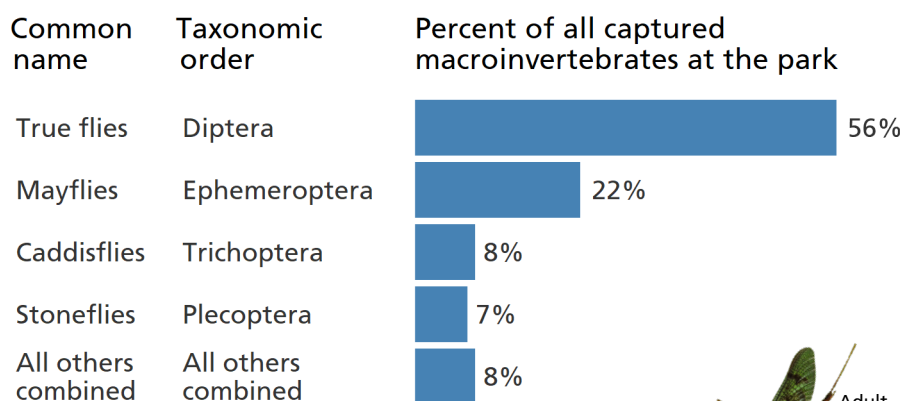


Images not to scale. Photos courtesy of J. Gallagher (dragonfly larvae), the Smithsonian Institution (mussel and crayfish), and Willamette Biology (worm), B. Henricks (all others) / Flickr.

What is the most common macroinvertebrate in park streams?

Over one-half of the benthic macroinvertebrate observations from the park are in the taxonomic order Diptera and are known as "true flies." True flies include insects like mosquitoes, deer flies, crane flies, and midges. True fly larvae are abundant in streams across the mid-Atlantic region.

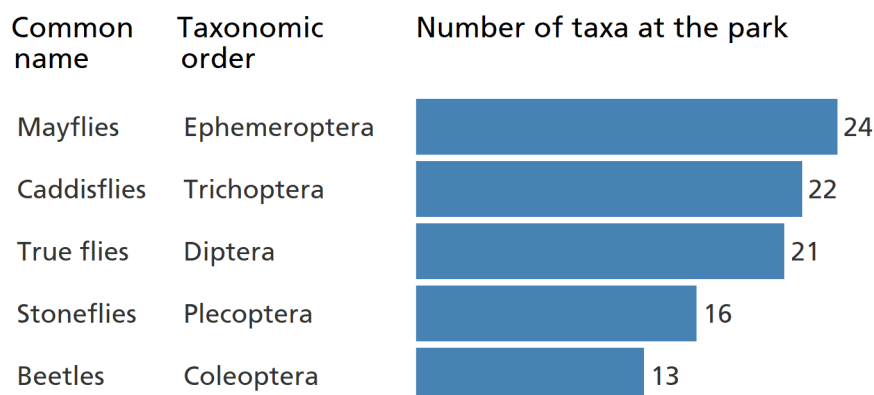
Mayflies are also very common at the park. After living up to a year as larvae in a stream, mature mayflies hatch into flying adults. In some species, those adults then complete their life cycle (mate and die) within just a few days.



Which macroinvertebrate group is the most diverse (has the largest # of species or genera)?

Taxa richness, or the number of unique species or genera in a sample, is a measure of the community composition of benthic macroinvertebrates. The top five most diverse groups (i.e. taxonomic orders) are shown to the right.

A total of 134 taxa have been identified at the park (including 110 taxa of insects). The top two most diverse groups are mayflies and caddisflies. With benthic macroinvertebrates, most individuals that are insects are identified to the genus taxonomic level. Non-insect macroinvertebrates are often not identified below the family level, and therefore, non-insect diversity (not shown) is not as well documented.



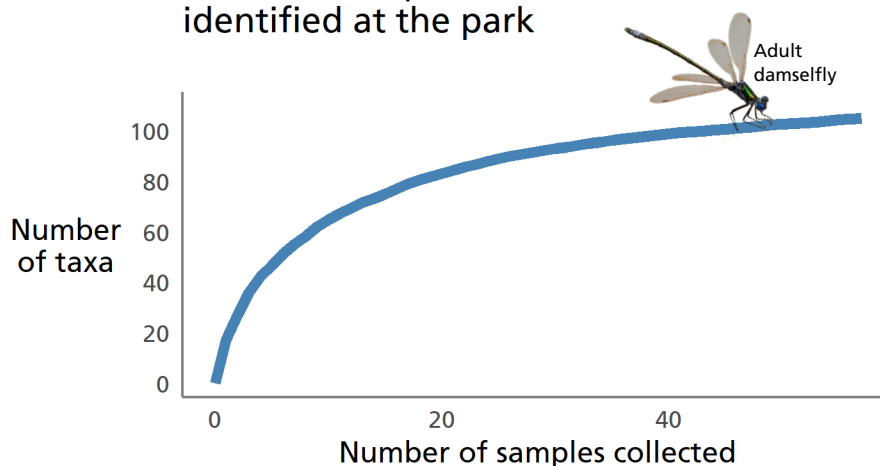
What's next?

The figure to the right shows how the number of discovered insect taxa at the park has increased with each additional macroinvertebrate sample. The number of identified taxa rises quickly in the first 20 samples, then starts to slowly flatten out. This indicates that additional samples are uncovering fewer new taxa.

Benthic macroinvertebrate monitoring efforts continue to focus on measuring the health of stream ecosystems in the park. These data help managers understand the condition and trends of park streams and identify potential stressors to these valuable resources.

For more information about this program, visit [the MIDN macroinvertebrate website](#) or [read the latest summary report](#).

Number of aquatic insect taxa identified at the park



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Network parks: Appomattox Court House NHP • Booker T. Washington NM • Eisenhower NHS • Fredericksburg & Spotsylvania NMP • Gettysburg NMP • Hopewell Furnace NHS • Petersburg NB • Richmond NBP • Shenandoah NP • Valley Forge NHP